ICBC Insurance Corporation of British Columbia

HAMILTON ASSOCIATES

INTRODUCING ROAD SAFETY AUDITS

AND DESIGN SAFETY REVIEWS

DRAFT DISCUSSION PAPER

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1.0 INTRODUCTION

1.1 Background

One of the key functions of a road transportation facility is to promote the safe movement of goods and people To ensure that road safety, as measured by the frequency and severity of collisions, is well managed along British Columbia roadways, a strategic approach is required to minimize the collision potential and the resultant economic and societal losses

An effective road safety strategy that aims to reduce the overall frequency and severity of collisions needs to include two key components

- A *reactive* strategy which involves retrofitting existing roads to mitigate known high collision locations or blackspots, and

- A *pro-active preventive* strategy to prevent the introduction of new collision risks by explicitly incorporating safety at the planning and design stage

A reactive strategy consists of the application of cost effective remedial measures on existing roads to reduce collision frequency and severity, typically as part of a blackspot identification and elimination program These programs identify collision prone locations based on historical collision characteristics, and consequently identify and implement appropriate countermeasures. Since 1989, the Insurance Corporation of British Columbia (ICBC) has been working closely with the Ministry of Transportation and Highways and municipalities in funding road improvements at collision prone locations throughout British Columbia. ICBC's Road Improvement Program has proven to be effective in reducing the frequency and severity of collisions

A reactive road safety strategy is an important component of road safety management; however, such a strategy responds to an identified road system deficiency, and requires that collisions already occur prior to undertaking mitigating measures. A preventive road safety strategy pro-actively aims to prevent collisions from occurring through the sound application of state-of-the-art safety planning and engineering principles to road design through the application of Road Safety Audits or Design Safety Reviews The main objective is to ensure that all newly designed road projects operate as safely as practicable. The systematic application of Road Safety Audits or Design Safety Reviews is expected to result in reduced life-cycle costs of new roadways by pro-actively identifying and eliminating potential safety hazards at the design stage. As well, by pro-actively addressing potential safety issues, the highest quality is built into a new facility, thereby promoting a safety-conscious planning, design and engineering environment

The use of Road Safety Audits has been adopted in many European and Australasian countries. A Road Safety Audit provides a formal, independent, and safety-focused review of the design as input to the design team at specified milestones. The audit recommendations aim to prevent the occurrence of collisions or reduce their severity should they occur The Design Safety Review serves the same purpose as a Road Safety Audit, but occurs throughout the design process rather than at specified milestones, and is a more informal and interactive process.

Recognizing the value of a pro-active safety strategy, the Federal Highway Administration is currently piloting Road Safety Audits in the United States, and agencies such as the Institute of Transportation Engineers are further exploring the concept and expanding the knowledge base for the transportation profession

1.2 Purpose of this Document

As an expanded effort to reduce collisions in the province, ICBC is interested in introducing Road Safety Audits and Design Safety Reviews in British Columbia The purpose of this discussion paper is to promote knowledge of these tools, and to stimulate discussion among the stakeholders including Ministry and municipal staff, ICBC, and private consultants.

1.3 Key Reference Documents

The United Kingdom, Australia and New Zealand have developed guidelines for Road Safety Audits, describing good practice and recommendations for effective procedures TABLE 1 1 summarizes the reference documents from these three countries. Previous research on Road Safety Audits was also conducted for ICBC, and the results were summarized in the report entitled A Strategy for Implementing Road Safety Audits in British Columbia, prepared by Hamilton Associates in November 1996. A comprehensive list of sources is included in the BIBLIOGRAPHY

TABLE 1.1 KEY REFERENCE DOCUMENTS

COUNTRY	PUBLISHING AGENCY	GUIDELINE DOCUMENT
United Kingdom	Institute of Highways & Transportation	Guidelines for the Safety Audit of Highways, 1996
Australia	Austroads	Road Safety Audits, 1994
New Zealand	Transit New Zealand	Safety Audit, Policy and Procedures, 1993

1.4 Overview of Roles and Responsibilities

For a Road Safety Audit or Design Safety Review to be successfully adopted as an integral part of major highway construction or reconstruction, it is necessary that all stakeholders (project owner, design team and safety team) have an explicit commitment to road safety The management of the procedures and the conduct of practice need to be clearly specified to identify the roles and responsibilities of the stakeholders. As an overview, these roles and responsibilities are.

Project Owner

The project owner, typically a road authority, has the responsibility for identifying the need for a safety audit or review, and for securing funding for the audit or review. The owner also sets the terms of reference, selects the safety team, and ensures that the design team and safety team communicate and cooperate effectively. Once the safety team complete its recommendations, the project owner may also need to provide guidance to the design team

Design Team

The design team needs to be familiar with audit and review procedures and practices. The design team should provide the background information required for an audit or a review, and needs to work in an open and cooperative manner with the safety team. The design team also needs to respond to the findings of the safety team, either by making revisions to the design, or by rationalizing design decisions

Safety Team

The safety audit or review should be undertaken by a safety team with experience in the most up to date road safety engineering principles The safety team needs to communicate and cooperate effectively with the design team, and needs to work quickly to avoid undue delays to the project The safety team is responsible for providing recommendations which enhance the safety performance of the design, either formally (in a Road Safety Audit) or more informally (through a Design Safety Review) The recommendations need to be supported by solid knowledge and justification based on the best and most recently available information and research

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2.0 PRINCIPLES OF SAFETY AUDITS AND REVIEWS

Similar to road safety engineering principles, safety audits and reviews are developed to minimize risks for the road users Risk is a function of probability, consequence and exposure The three elements of risk interact with each other and are often intertwined The relationship of the three elements with risk is illustrated in FIGURE 2 1

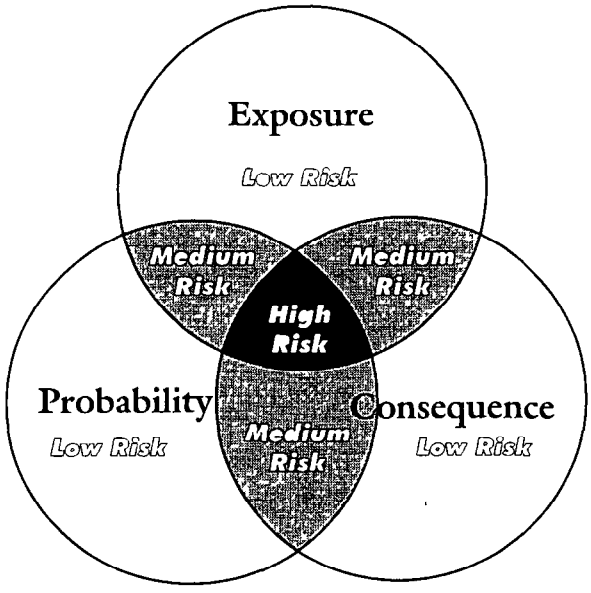


FIGURE 2.1 RISK ELEMENTS

Road Safety Audits and Design Safety Reviews strive to minimize risk by primarily concentrating on the consequence and probability elements, and to a certain extent the exposure element By applying the "forgiving highway" concept through the use of appropriate hazard management techniques, the consequence of a crash can be minimized Similarly, by using the "caring highway" concepts including techniques such as positive guidance, the probability of a crash can be reduced

2.1 Definitions

A Road Safety Audit

A Road Safety Audit is defined as a formal and independent review of a proposed road design by an expert safety team to assess the multi-modal safety performance of the design

An audit concentrates solely on the safety implications of a project and aims to:

- consider the safety of all road users,
- ensure that preventable collision-producing elements are absent;
- ensure that injury reducing elements are provided at suitable locations,
- ensure that suitable collision-reducing elements are included, and
- ensure that the project does not impact safety on adjacent roads

The outcome of the audit is a report identifying any safety concerns with the design, quantifying the safety implications of the relevant design decisions, and suggesting safer alternatives for consideration. The Road Safety Audit does not include a design function the road design remains the responsibility of the design team

An audit is *formal* since it requires documented recommendations from the safety team, and a documented response from the design team outlining how the safety recommendations are being addressed

An audit is *independent* since the safety team has no other association with the project, and the safety team is not part of the design team The safety team consists of individuals who have demonstrated road safety engineering expertise.

Finally, an audit requires that safety be addressed from a *multi-modal* perspective, so that the safety performance for all road users is considered and optimized

B Design Safety Review

The definition and objectives of a Design Safety Review are similar to a Road Safety Audit A Design Safety Review is defined as an independent review of a proposed road design by an expert safety team to assess the multi-modal safety performance of the design However, a Design Safety Review is conducted *during* the design process by an independent safety team The Design Safety Review is more informal and flexible in nature, and provides more opportunities for communication and interaction between the design team and the safety team

2.2 The Need for Safety Audits and Reviews

The need for safety audits and reviews primarily stems from two key issues which currently face road designers The first issue is the pressure currently faced by design teams to balance various competing needs in a project The second issue is more fundamental in nature Are design standards adequate in addressing safety? The following sections provide a discussion on these issues.

A Design Pressures

With limited resources to improve road and traffic conditions, design engineers are under pressure to provide a cost-effective design The various factors which need to be addressed include capacity requirements, right-of-way availability, geotechnical conditions, archaeological constraints, environmental considerations, socio-economical impacts and budget constraints These various factors are often in conflict, and design engineers need to balance the project characteristics to optimize project value

In recent years, the need for specialists to address the different factors involved in road design projects has become apparent Experts are therefore typically called upon to provide specialist reports on items such as the land use, environmental, geotechnical, archaeological, and socio-economic impacts of a project To balance the various competing needs, the use of value engineering is gaining popularity to optimize project cost The role of the design team is to receive the specialists' inputs, and accommodate as many of the competing demands as possible while still meeting the core project objectives

The design team therefore has a significant responsibility to balance the competing pressures which are brought to bear on a modern design project Compromises are almost always necessary to achieve as many project objectives as possible. Road Safety Audits or Design Safety Reviews are needed to ensure that road safety is *explicitly* addressed and given at least the same prominence as the other factors being considered in a road design project

B Design Standards

Traditionally, road safety has been incorporated into the design process by following design standards, while safety is implicitly considered. However, there are a number of safety concerns in strict adherence to design standards·

- *Desirable versus minimum standards·* Design standards are typically limit standards, where a minimum value must be met by the design team Good design practice requires the design team to exceed, rather than meet the minimum standards Meeting a minimum standard may not be the optimal or most desirable standard for the safety aspect of a particular design At the same time, a design that does not meet a minimum standard does not necessarily result in an unsafe road The Safety Audit or Design Review examines the implication of using various design criteria, and whenever possible, quantifies the safety impacts of deviating from desirable standards, to facilitate informed decision making.

- *Combination of standards* Individual design standards may appear to provide an adequate design However, combinations of standards may introduce safety concerns This is especially true when minimum standards are combined on a design The Safety Audit or Design Review examines the inter-relationship between the combined standards to assess the safety performance of the design

- *Age of the standards* Over time, road design standards evolve as newer research and design principles will surface and new relationships between various road design elements are established Driver and vehicle characteristics, road geometry and design principles may change It is quite common for design standards to lag behind the latest available research which relates safety performance to design features The Safety Audit or Design Review ensures that the latest available safety knowledge is incorporated in the design

Road Safety Audits and Design Safety Reviews can effectively identify potential safety concerns before any construction has taken place These tools are pro-active and represent an effective means to optimize safety in design

2.3 Process Description

As discussed in the previous section, a typical design process involves the examination of various issues such as environmental, geotechnical, structural, socio-economical, archaeological, political and financial concerns The design team often needs to balance and optimize the design to address these concerns Experts are utilized by the design team to address these specialized areas, and often tradeoffs are made The design is finished once the plans are checked for errors The road safety component is therefore currently missing as an explicit issue in the design process The typical design process and the different methods by which safety can be explicitly introduced are shown in FIGURE 2 2

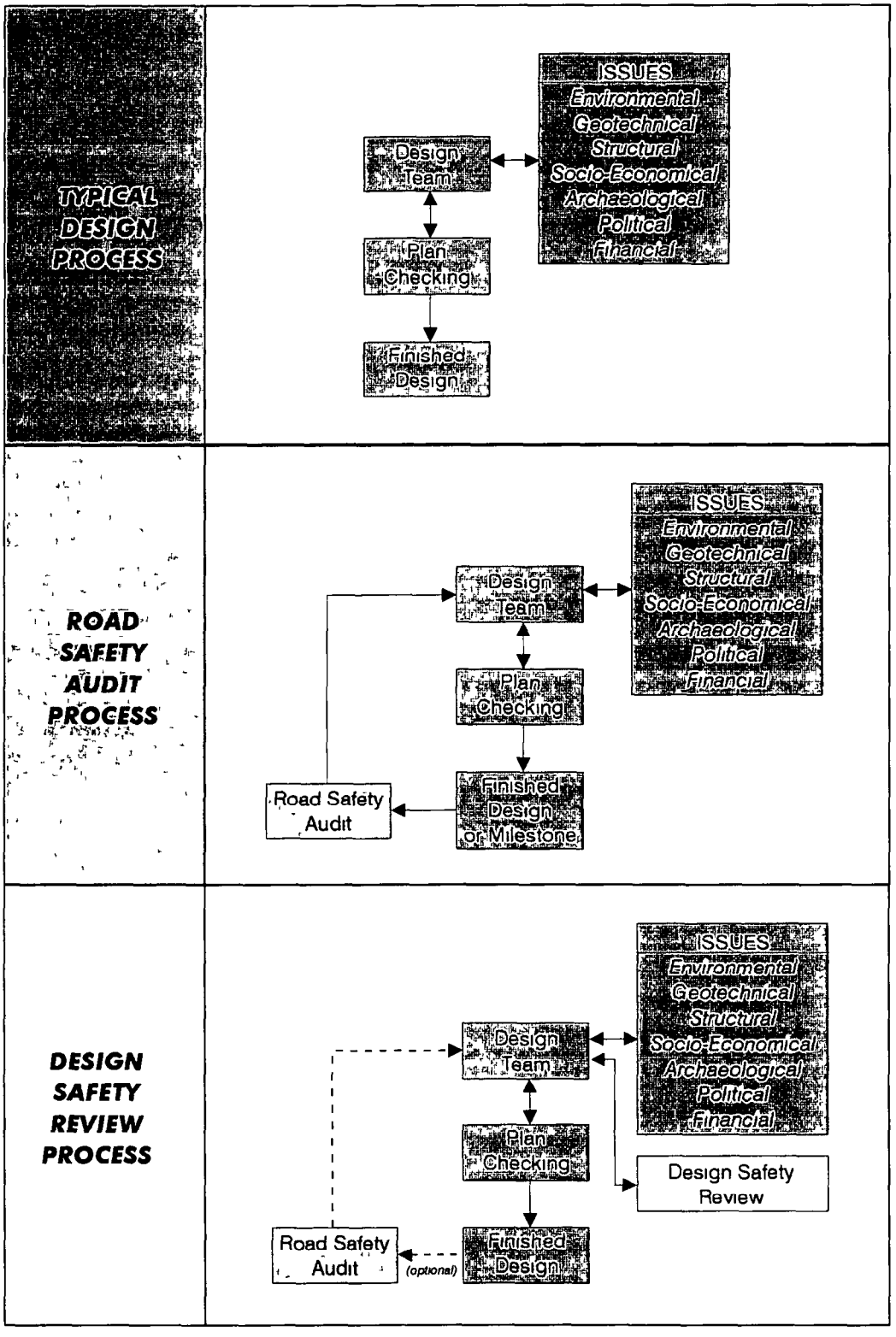


FIGURE 2.2 PROCESS DESCRIPTION

A Road Safety Audit process explicitly and independently addresses the safety of the finished design (or at specified design milestones) Upon receiving the recommendations of the audit report, the design team may elect to revise the design to address the safety issues identified in the audit This process is generally adopted in countries where Road Safety Audits are compulsory

A Design Safety Review process provides a more interactive and informal forum to address safety during the design process In a Design Safety Review, an independent safety team is assigned to the design team to address safety issues that may arise during the design process, rather than waiting for the design milestone to be reached prior to formally providing comments This process can expedite the design process while addressing potential safety issues Once the design is finished, a Road Safety Audit can still be conducted as an added level of safety enhancement

2.4 Audit Stages

There are several stages of a project at which a Road Safety Audit can be performed. Different issues can be addressed at each stage, as described below

Stage 1. Planning/Feasibility

At this stage, a safety audit can make recommendations relating to route choice, layout options, treatment alternatives, road design standards, and project scope. Safety is viewed on a "macro" scale and the focus is on how the project will impact or affect the continuity of the existing network and movements to and from the adjacent communities and surrounding land use During this stage, changes or improvements to enhance and promote safety are highly cost effective and relatively inexpensive

Stage 2. Functional/Preliminary Design

At this stage of the project, the specific design standards applied to the following elements should be addressed by the audit.

- horizontal and vertical alignment,
- cross section,
- sight distances,
- intersection and interchange layouts and traffic control,
- integration of pedestrian and cyclists, and
- parking movements

Major changes to the project after this stage are limited since right-of-way requirements may already be determined It may be useful to review the concept of pavement markings and signing at this stage in relation to alignments and passing strategy.

Stage 3. Detailed Design

At the detailed design stage, before the preparation of contract documents, the detailed geometric design elements should be addressed, including·

- road, intersection, and interchange design details,
- signing plan and pavement markings;
- channelization;
- lighting;
- road side features;
- clear zones;
- guard rails and barriers;
- median barriers, and
- landscaping and street furniture.

Stage 4 Pre-opening Stage

Before opening, a site inspection should be conducted by the Safety Team, preferably under a variety of conditions (night and day, wet and dry), to evaluate the safety performance of the facility The inspection should be carried out from the perspective of all road users, including pedestrians and cyclists

This stage is essential to ensure that the safety implications of changes to the final design which were implemented during construction are addressed While physical changes to the facility may be difficult at this stage, mitigation measures such as the addition of roadside barriers and warning signs, and the relocation of hazards (trees, utility poles) can still be implemented in response to the inspection

The cost effectiveness of the audit decreases for the latter stages of audits and reviews as changes become more difficult to implement The resources and details required also increase for each audit or review stage However, the early audit stages typically are more conceptual in nature, and are more difficult to conduct, requiring higher skill levels The relationships are illustrated in FIGURE 2 3

In all stages, effective practice depends on a commitment to the provision of safer highways throughout the road authority, particularly at the management decision-making level

Design Safety Reviews are similarly focused on enhancing safety at all stages of the design One major difference between Design Safety Reviews and Safety Audits is that whereas audits are typically programmed to specifically occur at one of the four stages described above, Design Safety Reviews can provide input at any time during the design process The safety team is accessible to the design team at any time to research and respond to safety issues and concerns as the design evolves

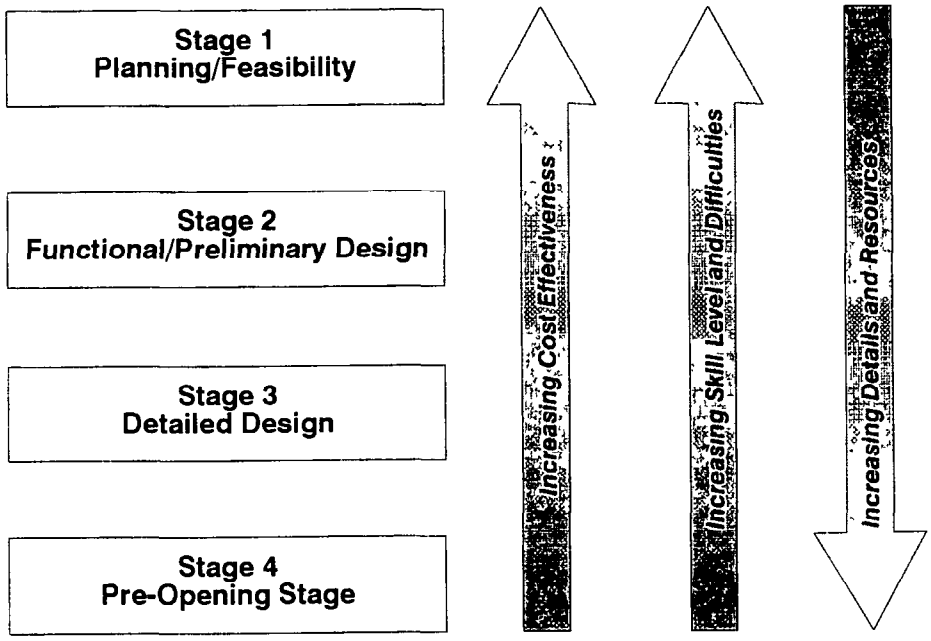


FIGURE 2.3 AUDIT AND REVIEW STAGES

Other Stages

Road Safety Audits have also been conducted at the "in-service" stage However, based on experience gained in Australia, New Zealand and British Columbia, it is preferred that safety reviews of in-service roads be removed from the audit process, for several reasons.

- In-service safety reviews are most typically in response to an already identified safety concern, and thus are better handled under a blackspot elimination program

- In-service safety reviews need to be more specifically solution oriented compared to audits

- In-service safety reviews require a separate process compared to audits, in that the safety report is submitted to the road owner, rather than a design team The owner's response procedures to the findings of an in-service safety review may be quite different than the design team's response procedures to an audit

- The principles of the Road Safety Audit are prevention and design revisions prior to construction. In-service reviews identify existing safety concerns which require maintenance or rehabilitation funding to rectify The financial implications of in-service reviews are therefore quite different from the implications of audits

In-service road safety reviews are therefore best removed from the audit realm, and should be treated as either "Operational and Safety Reviews" or as blackspot elimination studies.

It is possible that Road Safety Audit type studies be conducted for existing roads which do not have an explicit safety concern as part of a long-term preventive strategy However, such audits should be allocated a significantly lower priority than both design audits and blackspot elimination programs.

The construction stage is another phase of a project life where safety reviews can be considered However, this again is a different process than a design audit, since the safety review of roads under construction involves different parties (contractors and traffic management specialists), and drawings which relate to construction management rather than design features The safety reviews of roads under construction also require different reporting and response procedures. Construction stage safety reviews are certainly worthwhile, but are best treated as different than audits

The general direction is therefore to confine the scope of Road Safety Audits to the road *design* process, where audits are most effective, and the established procedures are most appropriate.

2.5 Applications

Road Safety Audits and Design Safety Reviews can be applied to all types of projects The types of projects can be categorized as follows.

- existing road improvement (rehabilitation and retrofit) projects,
- new road construction projects,
- development-driven projects; and
- traffic calming projects

A road agency needs to decide which projects to audit and at what stage. Some agencies require that all major road projects be audited, while others may require that only a percentage of projects be audited TABLE 2 1 summarizes a range of project types and the corresponding recommended stages of Audits. TABLE 2.1 represents a recommended practice and should be viewed as a guide only. Each road agency may decide to devise its own system in road safety programming, which should be flexible and cost effective to respond to the needs of individual projects Design Safety Reviews can similarly be adopted for various projects, either as replacements for audits or to provide an added focus on safety for major projects

TABLE 2.1 RECOMMENDED STAGES FOR VARIOUS PROJECTS

PROJECT	AUDIT STAGE			
	Planning/ Feasibility	Preliminary Design	Detailed Design	Pre-opening
Major New Highway	✓	✓	✓	✓
Minor New Highway	-	✓	✓	✓
Major Rehabilitation/Retrofit	-	✓	✓	✓
Minor Rehabilitation/Retrofit	-	✓	✓	-
Major Development	✓	✓	✓	✓
Minor Development	-	✓	✓	-
Traffic Calming	-	-	✓	✓

Note ✓ denotes recommended

2.6 The Safety Team

A safety audit or review should be performed by a team of specialists who have demonstrated experience and expertise in state of the art road safety engineering, highway design and collision investigation

The most common practice is to use a team of safety experts with different areas of expertise such as traffic operations and management, highway design, human factors, enforcement and maintenance It is recommended that the safety team include a mixture of younger and older members, and both men and women This introduces a variety of perspectives to the safety review process For smaller projects an audit or review may be undertaken by a single safety specialist, although this is not recommended An essential requirement is that the safety team should be independent of the design team

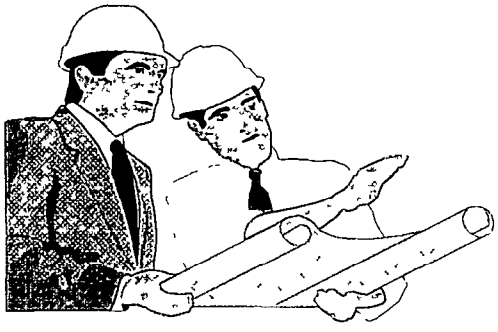
2.7 Roles and Responsibilities

The scope of the safety audit or review needs to be well defined at the onset of the project The terms of reference should clearly specify the roles and responsibilities of each party involved in the process The terms of reference may be either a standardized document by the agency or specifically developed for the project The terms of reference should include any special requirements of the audit or review (for example a visit to the site during winter conditions, review of an adjacent road network that may be impacted by the project), and the format to be used in the results presentation A well structured and organized safety audit or review will expedite the process

Communication protocols between each party involved in the process should be established from the start Well-defined communication channels lead to a well-managed and cost-effective project The roles and responsibilities of the project owner, design team and safety team may vary from one agency to another, depending on the available resources The typical roles and responsibilities of each party are illustrated in FIGURE 2 4, and are described as follows

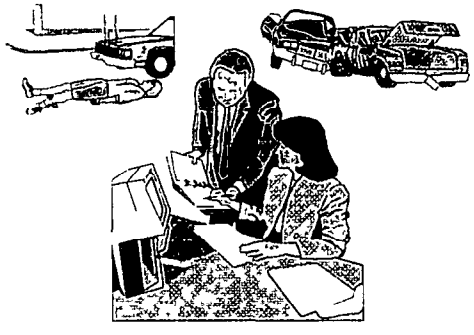
PROJECT OWNER

- express a commitment to road safety
- provide funding and resources
- accept safety audits and reviews as an essential quality control requirement
- commission audits and reviews at appropriate times
- select Safety Team
- facilitate the response to the recommendations of audits and reviews
- attend start-up and completion meetings



DESIGN TEAM

- attend start-up and completion meetings
- provide relevant information to Safety Team
- act upon and document response to recommendations of audit



SAFETY TEAM

- identify safety issues in the proposed design
- make constructive recommendations to enhance safety
- document safety issues and recommendations
- hold completion meeting with Project Owner and Design Team

FIGURE 2.4 ROLES AND RESPONSIBILITIES

Project Owner

The project owner needs to express a commitment to road safety as a critical element of the highway commissioning and design process. Funding and resources within the organization to conduct Safety Audits or Design Reviews should be incorporated as an integral service This commitment to safety will lead the owner organization to.

- accept Road Safety Audits or Design Safety Reviews as an essential quality control requirement for highway projects,
- commission Road Safety Audits or Design Safety Reviews at appropriate stages in their projects,
- select the safety team,
- attend the start-up meeting; and
- facilitate the response to the findings and recommendations of the audit or reviews

Design Team

The design team should facilitate the audit process by constructively cooperating with the safety team At the start-up meeting, the design team should provide the relevant drawings, background reports and information affecting the design A vital role of the design team is the assessment of the safety team's report and recommendations. The design team will then make the neccessary decisions to address the concerns raised by the safety team The reasons for any proposed corrective actions or non-actions must be documented by the design team to ensure that a proper response is formulated for every safety recommendation Some decisions may need to involve the project owner

Safety Team

The main role of the safety team is to identify any potential safety concerns in the proposed design. The safety team should also make constructive recommendations based on safety engineering principles to address their concerns. For Road Safety Audits, the safety concerns and recommendations should be documented in a formal audit report, and submitted to the design team. A completion meeting should be held by the safety team with the design team and the project owner. For Design Safety Reviews, the safety concerns and recommendations should be documented in internal memos, and submitted to the design team Regular meetings with the design team should be held during the review to encourage the exchange of information and ideas, and address safety issues as they arise during the design process

2.8 Costs and Benefits

A Costs

The cost of conducting a Road Safety Audit or Design Safety Review will vary depending upon the size of the project, its complexity and the stage. From experience gained in British Columbia, Ontario, Australia and the United Kingdom, the cost of conducting safety audits and reviews is approximately five to ten percent of the design cost. Typically the design cost of a project is approximately five percent of the capital cost. The cost of an audit or review is therefore less than one half of one percent of the overall capital cost of the project The pre-opening stage usually requires the greatest resources with the inclusion of specialist personnel such as police and maintenance staff, especially if the project had not been previously audited On smaller projects such as traffic calming or retrofit, the costs may be a higher percentage of the overall capital cost.

The costs of redesign to rectify problems identified in the audit or review should also be considered. This cost will naturally vary on a project to project basis Contingencies should be budgeted in the costing and time schedule of projects for the audit or review and possible redesigns. This will avoid unexpected delays in the overall progress of the project

B Potential Benefits

The systematic application of Road Safety Audits or Design Safety Reviews can ensure that good road safety practice is achieved in roadway construction and reconstruction projects The systematic application can also foster a principle of safety conscious design among owners and designers By implementing a systematic program for Road Safety Audits and Design Safety Reviews, significant benefits are expected to be realized.

Research conducted in the United Kingdom indicated that up to one-third of all collisions may be prevented by Road Safety Audits Other research indicates that Road Safety Audits have resulted in a 1 to 3 percent reduction in injury collisions

In British Columbia, approximately 34,000 injury collisions are reported annually The annual cost to ICBC of injury collisions alone is $1 2 billion With the relatively marginal costs of conducting Road Safety Audits and Design Safety Reviews, the potential upside return is tremendous For example, with a capital project cost of $10 million, a total audit cost of $50,000 can be expected The prevention of three injury collisions over the life of the project will result in a 2.1 return on the safety audit, assuming an injury cost of $34,000 Besides claims cost savings, lower health care and societal costs due to reduced collisions can be expected, as well as reduced need for costly remedial work after construction

The potential benefits of audits and reviews may also be assessed from a corporate risk management perspective. Road Safety Audits and Design Safety Reviews can be incorporated as part of the overall quality assurance program As such, audits and reviews are positive processes towards building a "quality-oriented" corporate culture By providing a high quality product, the potential for liability and the need for future remedial work may be reduced, thus reducing the overall risk taken by the agency.

2.9 Legal Perspective

In the United Kingdom, according to the report entitled Guidelines for the Safety Audit of Highways published by the Institute of Highways and Transportation, no claims have been made against a road authority due to deficient safety audit. The Institute suggests that the road authority "could be judged, inter alia, on the basis of consistency and objectivity of their safety audit procedures, and their compliance with respected published advice." In Australia, according to the report entitled Road Safety Audit published by Austroads, the issues of public authority liability for acts of negligence is still evolving and the courts are still searching for definitive answers. However, Austroads suggests that the current level of legal liability would not be raised by adopting Road Safety Audits as a safety enhancement process by a road authority The legal issues concerning Road Safety Audits generally fall into the following areas.

- Duty of care;
- Qualified immunity for public authorities,
- Reasonable care; and
- Principles of negligence.

The introduction of Road Safety Audits or Design Safety Reviews will likely alter the standard of care for road design and construction. An introductory assessment of the potential legal impact upon the participants in the audits and reviews process was undertaken in British Columbia. A basic legal analysis related to Road Safety Audit is provided below, the applicability of which is limited to the hypothetical situation described. The analysis and conclusions presented should not be applied to specific situations, which should be the subject of specific legal advice. The legal opinion was prepared by a British Columbia law firm, and the entire report is included in APPENDIX A. It is recommended that road agencies seeking to formally introduce Road Safety Audits and Design Safety Reviews obtain the advice of their own legal counsel.

A Tort Law and Government Liability

Governments face the same basic liabilities as any citizen in tort law However, courts are wary of imposing duties that may conflict with the wider social concerns inherent in the decisions of government Accordingly, the Supreme Court ruled that *true policy decisions* should be exempt from tortuous claims, so that governments are not restricted in making decisions based upon social, political or economic factors However, the *implementation* of those policy decisions may be subject to claims in tort *True policy decisions* are generally those that are dictated by financial, economic, social or political factors, and are not merely the product of administrative direction, expert or professional opinion, technical standards, or general standards of reasonableness

B Potential Liability of Participants

For the purposes of this document it was assumed that the owner of the road has retained a safety team to audit or review the design and construction of a new road The design team is a consulting engineer and the builder is an independent contractor, both of whom are employed by the owner pursuant to separate agreements The potential legal liability of each participant is as follows

Owner

The owner has statutory power to construct and maintain roads Though not stated, there must be an implied power to design roads within the expressed power to construct Tort law will impose a duty of care to design, construct and maintain the roads reasonably Liability for failures in that regard will be on the owner.

The decision to provide a new road will incorporate financial, economic, social and political factors. It can also be assumed that the decision will include whether to include a Road Safety Audit That owner decision is likely a true policy decision, and is thereby immune from review by tort law.

A decision by the owner not to audit may result in a road that is designed and constructed to a lower standard than would be the case if it were audited or reviewed. If made at the appropriate level, that decision would be a true policy decision and, accordingly, also immune from review by tort law.

However, if the true policy decision included a decision to audit, and if the safety team makes recommendations concerning the safety of the design or construction of the new road, must the recommendations be acted upon by the owner? Having made the true policy decision to audit, it is likely that the subsequent decisions on how to deal with the safety team's findings will be implementation decisions, arising from professional opinions and technical standards. Such decisions fall within the scope of tort law The failure of the owner to incorporate the safety team's recommendations will be reviewed from the standpoint of reasonableness

The owner has options for controlling his liability The owner could, for example, negotiate his contracts with the design team, safety team and builder to transfer the risk of failure to those entities. He could also attempt to immunize himself from tort law through exculpatory provisions in controlling legislation.

Design Team

The design team is employed by the owner to produce a design for the new road. Under the terms of its contract, the design team will owe a duty of care to the owner to produce a competent design, including competence in safety In addition, a common law duty of care on the part of the design team to the owner (as well as to the contractor and the travelling public) in respect of competence in design will probably arise in tandem with the duty in contract

The design team may be protected by the owner's general immunity from tort liability for true policy decisions However, if the safety team identifies a safety issue that does not directly arise from the true policy decision of the owner, can the design team safely ignore the safety team's advice? The introduction of Road Safety Audits will likely alter the standard of care for road design. Currently, road design engineers are judged by what road design engineers of average competence would do in the circumstances.

The regular application of safety specialist advice may render the current customary practice untenable, with the result that road design engineers may be judged in the future by the higher standard of the safety specialist Thus, the standard of care for the design of the new road may well be the higher standard of the safety team, rather than the former standard of design engineers of average competence The design team's decisions in this regard are subject to review under tort law. The design team ignores the safety team's advice at its peril, with the test being reasonableness.

The design team's liability to the owner can be addressed in its contract of employment. In addition, the design team can control some of its liability by the inclusion of appropriate disclaimers in the design and construction documents

Builder

The builder will be required by contract to follow the design for the new road, and owes contractual duties in that regard It may also have a common law duty of care not to construct some aspect of the new road which is not, to its knowledge, reasonably safe. However, like the design team, the builder may enjoy some protection from the owner's general immunity in respect of true policy decisions.

It is conceivable that the safety team will identify a safety issue regarding the design or construction of the new road that will be brought to the attention of the builder. Can the builder ignore that issue and escape a review under tort law if someone is injured? Probably not, unless the owner's immunity for pure policy decisions applies. The prudent builder will either modify its construction in accordance with the safety team's recommendations or, if the fault is in design, obtain either a confirmation from the owner of a change in design to comply with the safety team's finding, or an indemnity from the owner against future liability if the builder is directed to comply with the original design

Safety Team

The safety team will audit and report on the safety of the design and construction of the new road. The safety team's duty of care to the owner in respect of the competence of the report is primarily a matter of contract law, though reliance upon the report by the owner will probably generate a common law duty of care in tandem with the contractual duty, to be assessed by tort law in the event of a loss.

It is conceivable that others will rely upon that report as well The design team and the builder may rely upon the report to confirm their own work, and may suffer if the report has been negligently prepared Such reliance may generate a common law duty of care to be assessed by tort law in the event of a loss.

If the safety team identifies a safety issue in respect of the design or construction of a new road, the safety team *must* include that issue in the report Failure to do so will doubtless be a breach of the standard of care Whether there is a duty of care extending beyond reporting the issue is unknown.

It would be appropriate for the safety team to some appropriately worded disclaimer in its report to limit its liability.

Funding Agency

If the Road Safety Audit is funded by an agency which is legally separate from the owner, will that agency bear any liability under tort law for any failures of the audit which cause damage or injury? Pure gratuitous funding would be unlikely to attract any liability However, input into the audit, or participation in the flow of the audit process may change that simple situation into something more complicated and may require legal advice